

# **Building NOAA's Environmental Real-time Observation Network**

## **Site Installation Plan Appendices May, 2006**

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## **Appendix A. Equipment and Materials Checklists**

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This appendix includes equipment and materials checklists for the three possible station configurations: 3-meter tower on a 24-by-24-foot plot, 3-meter tower on a 32-by-32-foot plot, and tall tower on a 32-by-32-foot plot.

**EQUIPMENT AND MATERIALS CHECKLIST:  
3-METER TOWER ON A 24-BY-24-FOOT PLOT**

Units Included	Units Required	Quantity per Station	
			<b>Tower and Accessories</b>
		1	7-foot tower section
		1	Tower top plate
		1	Hinged tower base plate
		2 Sets	Tower section mounting hardware
		6	4-foot-long L-shaped ½" or 5/8" dia. rebar rods for anchoring base plate
			Concrete if unable to use rebar
		1 Set	Concrete anchoring hardware if unable to use rebar
		40'	Guy wire cable
		15	Guy wire cable clamps
		3	Guy wire thimbles
		3	Guy wire eye and claw turnbuckles
		3	Guy wire anchors
		1	Lightning rod, aluminum or copper
		1	8-foot copper-clad steel ground rod
		( )	Spare ground rods if rocky soil or shallow bedrock
		2	Copper or stainless steel acorn clamps for lightning rod and ground rod
		( )	Spare copper or stainless steel acorn clamps (1 per spare ground rod)
		8' 6"	Copper grounding cable for lightning rod
		1	Copper or stainless steel ground wire clamp for tower
		8'	6 AWG solid copper ground wire
		( )	Spare 6 AWG solid copper ground wire (3' 5" per spare ground rod)
		1	Communication antenna
		1 Set	Communication antenna mounting hardware
		6'	Coaxial cable for antenna

Units Included	Units Required	Quantity per Station	
			<b>Precipitation Gauge</b>
		1	GEONOR T-200B3W weighing bucket gauge
		1 Set	GEONOR gauge mounting hardware
		3	Vibrating wire sensors
		1	GEONOR pedestal
		1 Set	GEONOR pedestal mounting hardware
		1	Steel screw foundation
			Concrete if unable to use steel screw foundation
		1 Set	Concrete anchoring hardware if unable to use steel screw foundation
		1	Alter shield w/support arms
		1 Set	Alter shield hardware
		1	32' Sensor cable for connection to data logger
		26'	3/4" dia. water-tight non-metallic conduit

			<b>Sensors</b>
		1	Air temperature sensor w/cable
		1	Relative humidity sensor w/cable
		1	Air temperature/relative humidity mounting arm
		1 Set	Air temperature/relative humidity mounting arm hardware
		( )	Gill radiation shields
		( )	Sets of gill radiation shield mounting hardware
		1	Dewpoint sensor w/cable
		1	Cup anemometer w/cable
		1	Cup anemometer mounting arm
		1 Set	Cup anemometer mounting arm hardware
		1	Pyranometer w/cable
		1	Pyranometer mounting arm
		1	Pyranometer mounting bracket
		1 Set	Pyranometer mounting arm & bracket hardware
		1	Pyranometer mounting plate w/bubble level
		1	Barometer
		2'	Barometer inlet tubing
		1	Skin temperature sensor w/cable
		1 Set	Skin temperature sensor mounting hardware
		5	Soil moisture/temperature sensors w/cables
		73'	3/4" dia. water-tight non-metallic conduit
		7' 6"	Braided metallic protective sheathing for soil moisture/temperature cables
		5	Soil moisture plot markers

Units Included	Units Required	Quantity per Station	
<b>Data Logger Enclosure and Electronics</b>			
		1	Data logger enclosure w/grounding lug and interior mounting hardware
		1 Set	Data logger enclosure mounting hardware
		1	Campbell CR10X or Vaisala QML201 data logger
		1	Vaisala DSU232-M3 comms module, if Vaisala station
		1 Set	Vaisala terminal blocks and relays, if Vaisala station
		1	Campbell XT-AMT16/32 or Vaisala QMU 101 multiplexer, if soil moisture
		3	GEONOR hybrid interfaces
		1	LETS radio, if LETS comms
		1	Cellular radio/modem, if cellular comms
		1	GOES transmitter, if GOES comms
		2	Wireless RS-232 radios, if human observer
		1	PDA, if human observer

<b>Power</b>			
		1	Solar panel mast, if required
		1	Solar panel mast foundation, if required
		1	Solar panel mast lightning rod, if required
		1	( )W Solar panel w/5' cable (21' cable if mounted on separate mast)
		1 Set	Solar panel mounting hardware, if solar powered
		1	AC power transformer, if AC powered
		1	AC surge suppressor, if AC powered
		1	Voltage regulator
		1	Additional voltage regulator if Vaisala station
		( )	( )Ah Battery
		( )	Battery wire sets
		1 Set	Station power wires
		2	Fuse holder for ATO fast-acting automotive blade fuse, if required
		( )	3 amp ATO fast-acting automotive blade fuse
		( )	5 amp ATO fast-acting automotive blade fuse
		( )	7.5 amp ATO fast-acting automotive blade fuse
		1	Power equipment enclosure, if required
		1	Power equipment enclosure mounting hardware, if required
		12'	¾" dia. water-tight non-metallic conduit, if solar panel mast required

<b>Miscellaneous</b>			
		~50	Plastic cable ties
			Water-tight sealing clay
		( )	Fence panels
		( )	Fence posts
		5	Gallon size plastic zipper bags for soil samples

Units Included	Units Required	Quantity per Station	
			<b>Special Tools</b>
		1	Digital camera
		1	Post driver
		1	Post hole digger
		1	Spade
		1	Gas-powered auger
		1	Steel screw foundation wrench tool
		1 Set	Metric Allen and hex wrenches
		1	Metric ratcheting Allen wrench for confined spaces
		1 Set	Metric Allen wrenches that can work at an angle
		1	Inclinometer
		1	Compass
		1	Mirror-on-a-stick
		11	Troemer-certified machined brass 1000g precipitation calibration weights
		1	Aluminum base/centering precipitation calibration weight
		1	Precision bubble level
		1	Bi-directional RF power meter for GOES, LETS frequency bands

**EQUIPMENT AND MATERIALS CHECKLIST:  
3-METER TOWER ON A 32-BY-32-FOOT PLOT**

Units Included	Units Required	Quantity per Station	
			<b>Tower and Accessories</b>
		1	7-foot tower section
		1	Tower top plate
		1	Hinged tower base plate
		2 Sets	Tower section mounting hardware
		6	4-foot-long L-shaped ½" or 5/8" dia. rebar rods for anchoring base plate
			Concrete if unable to use rebar
		1 Set	Concrete anchoring hardware if unable to use rebar
		40'	Guy wire cable
		15	Guy wire cable clamps
		3	Guy wire thimbles
		3	Guy wire eye and claw turnbuckles
		3	Guy wire anchors
		1	Lightning rod, aluminum or copper
		1	8-foot copper-clad steel ground rod
		( )	Spare ground rods if rocky soil or shallow bedrock
		2	Copper or stainless steel acorn clamps for lightning rod and ground rod
		( )	Spare copper or stainless steel acorn clamps (1 per spare ground rod)
		8' 6"	Copper grounding cable for lightning rod
		1	Copper or stainless steel ground wire clamp for tower
		8'	6 AWG solid copper ground wire
		( )	Spare 6 AWG solid copper ground wire (3' 5" per spare ground rod)
		1	Communication antenna
		1 Set	Communication antenna mounting hardware
		6'	Coaxial cable for antenna

Units Included	Units Required	Quantity per Station	
			<b>Precipitation Gauge</b>
		1	GEONOR T-200B3W weighing bucket gauge
		1 Set	GEONOR gauge mounting hardware
		3	Vibrating wire sensors
		1	GEONOR pedestal
		1 Set	GEONOR pedestal mounting hardware
		1	Steel screw foundation
			Concrete if unable to use steel screw foundation
		1 Set	Concrete anchoring hardware if unable to use steel screw foundation
		1	Alter shield w/support arms
		1 Set	Alter shield hardware
		1	32' Sensor cable for connection to data logger
		26'	3/4" dia. water-tight non-metallic conduit

			<b>Sensors</b>
		1	Air temperature sensor w/cable
		1	Relative humidity sensor w/cable
		1	Air temperature/relative humidity mounting arm
		1 Set	Air temperature/relative humidity mounting arm hardware
		( )	Gill radiation shields
		( )	Sets of gill radiation shield mounting hardware
		1	Dewpoint sensor w/cable
		1	Cup anemometer w/cable
		1	Cup anemometer mounting arm
		1 Set	Cup anemometer mounting arm hardware
		1	Pyranometer w/cable
		1	Pyranometer mounting arm
		1	Pyranometer mounting bracket
		1 Set	Pyranometer mounting arm & bracket hardware
		1	Pyranometer mounting plate w/bubble level
		1	Barometer
		2'	Barometer inlet tubing
		1	Skin temperature sensor w/cable
		1 Set	Skin temperature sensor mounting hardware
		5	Soil moisture/temperature sensors w/cables
		73'	3/4" dia. water-tight non-metallic conduit
		7' 6"	Braided metallic protective sheathing for soil moisture/temperature cables
		5	Soil moisture plot markers



Units Included	Units Required	Quantity per Station	
<b>Data Logger Enclosure and Electronics</b>			
		1	Data logger enclosure w/grounding lug and interior mounting hardware
		1 Set	Data logger enclosure mounting hardware
		1	Campbell CR10X or Vaisala QML201 data logger
		1	Vaisala DSU232-M3 comms module, if Vaisala station
		1 Set	Vaisala terminal blocks and relays, if Vaisala station
		1	Campbell XT-AMT16/32 or Vaisala QMU 101 multiplexer, if soil moisture
		3	GEONOR hybrid interfaces
		1	LETS radio, if LETS comms
		1	Cellular radio/modem, if cellular comms
		1	GOES transmitter, if GOES comms
		2	Wireless RS-232 radios, if human observer
		1	PDA, if human observer

<b>Power</b>			
		1	Solar panel mast, if required
		1	Solar panel mast foundation, if required
		1	Solar panel mast lightning rod, if required
		1	( )W Solar panel w/5' cable (21' cable if mounted on separate mast)
		1 Set	Solar panel mounting hardware, if solar powered
		1	AC power transformer, if AC powered
		1	AC surge suppressor, if AC powered
		1	Voltage regulator
		1	Additional voltage regulator if Vaisala station
		( )	( )Ah Battery
		( )	Battery wire sets
		1 Set	Station power wires
		2	Fuse holder for ATO fast-acting automotive blade fuse, if required
		( )	3 amp ATO fast-acting automotive blade fuse
		( )	5 amp ATO fast-acting automotive blade fuse
		( )	7.5 amp ATO fast-acting automotive blade fuse
		1	Power equipment enclosure, if required
		1	Power equipment enclosure mounting hardware, if required
		12'	¾" dia. water-tight non-metallic conduit, if solar panel mast required

<b>Miscellaneous</b>			
		~50	Plastic cable ties
			Water-tight sealing clay
		( )	Fence panels
		( )	Fence posts
		5	Gallon size plastic zipper bags for soil samples

Units Included	Units Required	Quantity per Station	
			<b>Special Tools</b>
		1	Digital camera
		1	Post driver
		1	Post hole digger
		1	Spade
		1	Gas-powered auger
		1	Steel screw foundation wrench tool
		1 Set	Metric Allen and hex wrenches
		1	Metric ratcheting Allen wrench for confined spaces
		1 Set	Metric Allen wrenches that can work at an angle
		1	Inclinometer
		1	Compass
		1	Mirror-on-a-stick
		11	Troemer-certified machined brass 1000g precipitation calibration weights
		1	Aluminum base/centering precipitation calibration weight
		1	Precision bubble level
		1	Bi-directional RF power meter for GOES, LETS frequency bands

**EQUIPMENT AND MATERIALS CHECKLIST:  
STATION WITH A TALL TOWER ON A 32-BY-32-FOOT PLOT**

Units Included	Units Required	Quantity per Station	
			<b>Tower and Accessories</b>
		3	7-foot tower section
		1	9-foot tapered tower section
		4 Sets	Tower section mounting hardware
		1	Hinged tower base plate
		6	4-foot-long L-shaped ½" or 5/8" dia. rebar rods for anchoring base plate
			Concrete if unable to use rebar
		1 Set	Concrete anchoring hardware if unable to use rebar
		160'	Guy wire cable
		15	Guy wire cable clamps
		3	Guy wire thimbles
		3	Guy wire eye and claw turnbuckles
		3	4' guy wire screw anchors
		1	Lightning rod, aluminum or copper
		1	Lightning rod cable connector
		2	Lightning rod mounting arms
		1	8-foot copper-clad steel ground rod
		( )	Spare ground rods if rocky soil or shallow bedrock
		1	Large ground rod cable clamp
		( )	Spare small ground rod cable clamps (1 per spare ground rod)
		29'	Aluminum grounding cable for lightning rod
		2'	Copper grounding cable for lightning rod
		1	Stainless steel grounding cable splicing clamp
		1	Copper or stainless steel ground wire clamp for tower
		8'	6 AWG solid copper ground wire
		( )	Spare 6 AWG solid copper ground wire (3' 5" per spare ground rod)
		1	Communication antenna
		1 Set	Communication antenna mounting hardware
		27'	Coaxial cable for antenna

Units Included	Units Required	Quantity per Station	
			<b>Precipitation Gauge</b>
		1	GEONOR T-200B3W weighing bucket gauge
		1 Set	GEONOR gauge mounting hardware
		3	Vibrating wire sensors
		1	GEONOR pedestal
		1 Set	GEONOR pedestal mounting hardware
		1	Steel screw foundation
			Concrete if unable to use steel screw foundation
		1 Set	Concrete anchoring hardware if unable to use steel screw foundation
		1	Alter shield w/support arms
		1 Set	Alter shield hardware
		1	32' Sensor cable for connection to data logger
		26'	¾" dia. water-tight non-metallic conduit

			<b>Sensors</b>
		1	Air temperature sensor w/cable
		1	Relative humidity sensor w/cable
		1	Air temperature/relative humidity mounting arm
		1 Set	Air temperature/relative humidity mounting arm hardware
		( )	Gill radiation shields
		( )	Sets of gill radiation shield mounting hardware
		1	Dewpoint sensor w/cable
		1	Cup anemometer w/cable
		1	Cup anemometer mounting arm
		1 Set	Cup anemometer mounting arm hardware
		1	Prop vane anemometer w/cable
		1	Prop vane anemometer mounting pipe
		1	Pyranometer w/cable
		1	Pyranometer mounting arm
		1	Pyranometer mounting bracket
		1 Set	Pyranometer mounting arm & bracket hardware
		1	Pyranometer mounting plate w/bubble level
		1	Barometer
		2'	Barometer inlet tubing
		1	Skin temperature sensor w/cable
		1 Set	Skin temperature sensor mounting hardware
		5	Soil moisture/temperature sensors w/cables
		73'	¾" dia. water-tight non-metallic conduit
		7' 6"	Braided metallic protective sheathing for soil moisture/temperature cables
		5	Soil moisture plot markers

Units Included	Units Required	Quantity per Station	
<b>Data Logger Enclosure and Electronics</b>			
		1	Data logger enclosure w/grounding lug and interior mounting hardware
		1 Set	Data logger enclosure mounting hardware
		1	Campbell CR10X or Vaisala QML201 data logger
		1	Vaisala DSU232-M3 comms module, if Vaisala station
		1 Set	Vaisala terminal blocks and relays, if Vaisala station
		1	Campbell XT-AMT16/32 or Vaisala QMU 101 multiplexer, if soil moisture
		3	GEONOR hybrid interfaces
		1	LETS radio, if LETS comms
		1	Cellular radio/modem, if cellular comms
		1	GOES transmitter, if GOES comms
		2	Wireless RS-232 radios, if human observer
		1	PDA, if human observer

			<b>Power</b>
		1	( )W Solar panel w/18' cable, if solar powered
		1 Set	Solar panel mounting hardware, if solar powered
		1	AC power transformer, if AC powered
		1	AC surge suppressor, if AC powered
		1	Voltage regulator
		1	Additional voltage regulator if Vaisala station
		( )	( )Ah Battery
		( )	Battery wire sets
		1 Set	Station power wires
		2	Fuse holder for ATO fast-acting automotive blade fuse, if required
		( )	3 amp ATO fast-acting automotive blade fuse
		( )	5 amp ATO fast-acting automotive blade fuse
		( )	7.5 amp ATO fast-acting automotive blade fuse
		1	Power equipment enclosure, if required
		1	Power equipment enclosure mounting hardware, if required

			<b>Miscellaneous</b>
		~100	Plastic cable ties
			Water-tight sealing clay
		( )	Fence panels
		( )	Fence posts
		5	Gallon size plastic zipper bags for soil samples

Units Included	Units Required	Quantity per Station	
			<b>Special Tools</b>
		1	Digital camera
		1	Post driver
		1	Post hole digger
		1	Spade
		1	Gas-powered auger
		1	Steel screw foundation wrench tool
		1 Set	Metric Allen and hex wrenches
		1	Metric ratcheting Allen wrench for confined spaces
		1 Set	Metric Allen wrenches that can work at an angle
		1	Inclinometer
		1	Compass
		1	Mirror-on-a-stick
		11	Troemer-certified machined brass 1000g precipitation calibration weights
		1	Aluminum base/centering precipitation calibration weight
		1	Precision bubble level
		1	Bi-directional RF power meter for GOES, LETS frequency bands

## **Appendix B. Installation Checklists**

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This appendix includes installation checklists for the three possible station configurations: 3-meter tower on a 24-by-24-foot plot, 3-meter tower on a 32-by-32-foot plot, and tall tower on a 32-by-32-foot plot.

**INSTALLATION CHECKLIST:**  
**STATION WITH A 3-METER TOWER ON A 24-BY-24-FOOT PLOT**  
 (Use only **BLACK INK** to facilitate scanning)

STATION ID	DATE	INSTALLER
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Use initials to indicate that step has been completed

	Site verified clear of underground utility lines
	If utility lines present, locations marked and can be avoided in site installation
	Frost line depth information obtained
	Pre-installation photos taken
	Vegetation cut
	Tower anchor/foundation hole photo taken, if applicable
	Tower base plate installed
	Precipitation gauge anchor/foundation hole photo taken, if applicable
	Precipitation gauge foundation and pedestal installed
	Guy wire anchors installed
	Ground rod/plate/mesh installed
	Additional ground rods driven, if needed
	Tower top plate installed
	Lightning rod installed and grounding cable clamped to rod
	Tower section installed upright on base plate and hinged part secured
	Conduit installed between tower and precipitation gauge
	Guy wires installed, tower plumb, tension adjusted
	Guy wire turnbuckle safety cables installed
	Air temperature/relative humidity radiation shields and arm mounted at 1.5 meters
	Pyranometer mounting arm and plate mounted, if applicable
	Cup anemometer and arm mounted at 2 meters
	Logger enclosure mounted to northwest side of tower
	Solar panel mast installed w/lightning rod, if applicable
	Solar panel mounted to south side of tower or solar panel mast and tilt set, if solar powered
	Battery enclosure mounted to northeast side of tower, if applicable
	Lightning rod grounding cable routed and secured to southeast leg of tower
	All ground rods connected directly to east ground rod
	Logger enclosure, tower, and (if applicable) solar panel mast connected to east ground rod
	Lightning rod grounding cable connected to east ground rod
	Communication antenna mounted and connected to radio
	Photo taken of AC power line trench, if AC powered and visible
	Buried AC power line locations in plot shown on as-built drawing
	Photo taken of AC power line trench, if AC powered and possible
	Circuit breaker and surge suppressor installed, if AC powered
	Fuse installed between battery and station
	Fuse installed between battery and precipitation gauge heater
	Battery connected to regulator and to station and station powered up



	Charging source connected to regulator and charging verified
	Program/setup downloaded to data logger
	LETS radio, cellular modem, or GOES transmitter installed, configured, and tested
	Air temperature probe installed and reading verified
	Relative humidity probe installed and reading verified, if provided
	Pyranometer installed and reading verified, if provided
	Cup anemometer connected to data logger and reading verified, if provided
	Precipitation gauge installed
	Precipitation gauge calibrated and calibration sheet complete
	2" soil moisture/temperature photo taken, if sensor provided
	4" soil moisture/temperature photo taken, if sensor provided
	8" soil moisture/temperature photo taken, if sensor provided
	20" soil moisture/temperature photo taken, if sensor provided
	40" soil moisture/temperature photo taken, if sensor provided
	2" soil moisture/temperature sensor installed, and reading verified, if provided
	4" soil moisture/temperature sensor installed and reading verified, if provided
	8" soil moisture/temperature sensor installed and reading verified, if provided
	20" soil moisture/temperature sensor installed and reading verified, if provided
	40" soil moisture/temperature sensor installed and reading verified, if provided
	Ground repaired over all trenches
	Fence installed, if necessary
	16 units of desiccant placed in logger enclosure, if applicable
	Logger enclosure cable entry points sealed, if applicable
	All sensor readings verified
	Positive communication and data collection verified between station and NERON monitoring facility
	As-built drawing complete
	Station metadata form complete
	4 post-installation photos looking toward station taken
	Cover shot photo taken
	Mast/precipitation foundation photos taken, if applicable
	Soil moisture/temperature plot photos taken
	GEONOR calibration sheet submitted to NERON Project Office
	Photos named as specified and submitted to NERON Project Office
	As-built drawing submitted to NERON Project Office
	Station metadata form submitted to NERON Project Office
	Installation checklist submitted to NERON Project Office

**INSTALLATION CHECKLIST:**  
**STATION WITH A 3-METER TOWER ON A 32-BY-32-FOOT PLOT**  
 (Use only **BLACK INK** to facilitate scanning)

STATION ID	DATE	INSTALLER
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Use initials to indicate that step has been completed

	Site verified clear of underground utility lines
	If utility lines present, locations marked and can be avoided in site installation
	Frost line depth information obtained
	Pre-installation photos taken
	Vegetation cut
	Tower anchor/foundation hole photo taken, if applicable
	Tower base plate installed
	Precipitation gauge anchor/foundation hole photo taken, if applicable
	Precipitation gauge foundation and pedestal installed
	Guy wire anchors installed
	Ground rod/plate/mesh installed
	Additional ground rods driven, if needed
	Tower top plate installed
	Lightning rod installed and grounding cable clamped to rod
	Tower section installed upright on base plate and hinged part secured
	Conduit installed between tower and precipitation gauge
	Guy wires installed, tower plumb, tension adjusted
	Guy wire turnbuckle safety cables installed
	Air temperature/relative humidity radiation shields and arm mounted at 1.5 meters
	Pyranometer mounting arm and plate mounted, if applicable
	Cup anemometer and arm mounted at 2 meters
	Logger enclosure mounted to northwest side of tower
	Solar panel mast installed w/lightning rod, if applicable
	Solar panel mounted to south side of tower or solar panel mast and tilt set, if solar powered
	Battery enclosure mounted to northeast side of tower, if applicable
	Lightning rod grounding cable routed and secured to southeast leg of tower
	All ground rods connected directly to east ground rod
	Logger enclosure, tower, and (if applicable) solar panel mast connected to east ground rod
	Lightning rod grounding cable connected to east ground rod
	Communication antenna mounted and connected to radio
	Photo taken of AC power line trench, if AC powered and visible
	Buried AC power line locations in plot shown on as-built drawing
	Photo taken of AC power line trench, if AC powered and possible
	Circuit breaker and surge suppressor installed, if AC powered
	Fuse installed between battery and station
	Fuse installed between battery and precipitation gauge heater
	Battery connected to regulator and to station and station powered up

	Charging source connected to regulator and charging verified
	Program/setup downloaded to data logger
	LETS radio, cellular modem, or GOES transmitter installed, configured, and tested
	Air temperature probe installed and reading verified
	Relative humidity probe installed and reading verified, if provided
	Pyranometer installed and reading verified, if provided
	Cup anemometer connected to data logger and reading verified, if provided
	Precipitation gauge installed
	Precipitation gauge calibrated and calibration sheet complete
	2" soil moisture/temperature photo taken, if sensor provided
	4" soil moisture/temperature photo taken, if sensor provided
	8" soil moisture/temperature photo taken, if sensor provided
	20" soil moisture/temperature photo taken, if sensor provided
	40" soil moisture/temperature photo taken, if sensor provided
	2" soil moisture/temperature sensor installed, and reading verified, if provided
	4" soil moisture/temperature sensor installed and reading verified, if provided
	8" soil moisture/temperature sensor installed and reading verified, if provided
	20" soil moisture/temperature sensor installed and reading verified, if provided
	40" soil moisture/temperature sensor installed and reading verified, if provided
	Ground repaired over all trenches
	Fence installed, if necessary
	16 units of desiccant placed in logger enclosure, if applicable
	Logger enclosure cable entry points sealed, if applicable
	All sensor readings verified
	Positive communication and data collection verified between station and NERON monitoring facility
	As-built drawing complete
	Station metadata form complete
	4 post-installation photos looking toward station taken
	Cover shot photo taken
	Mast/precipitation foundation photos taken, if applicable
	Soil moisture/temperature plot photos taken
	GEONOR calibration sheet submitted to NERON Project Office
	Photos named as specified and submitted to NERON Project Office
	As-built drawing submitted to NERON Project Office
	Station metadata form submitted to NERON Project Office
	Installation checklist submitted to NERON Project Office

## INSTALLATION CHECKLIST: TALL TOWER ON A 32-BY-32-FOOT PLOT

(Use only **BLACK INK** to facilitate scanning)

STATION ID	DATE	INSTALLER
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Use initials to indicate that step has been completed

	Site verified clear of underground utility lines
	If utility lines present, locations marked and can be avoided in site installation
	Frost line depth information obtained
	Pre-installation photos taken
	Vegetation cut
	Tower foundation hole photo taken, if applicable
	Tower base plate installed
	Precipitation gauge anchor/foundation hole photo taken, if applicable
	Precipitation gauge steel screw foundation and pedestal installed
	Guy wire anchors installed
	Ground rod/plate/mesh installed
	Additional ground rods driven, if needed
	Tower sections bolted together and bolted to base plate
	Air temperature/relative humidity radiation shields and arm mounted at 1.5 meters
	Pyranometer mounting arm and plate mounted, if provided
	Cup anemometer and arm mounted at 2 meters
	Logger enclosure mounted to northwest side of tower
	Battery enclosure mounted to south side of tower, if applicable
	Solar panel mounted to south side of tower and tilt set, if solar powered
	Lightning rod mounted and grounding cable connected and routed along southeast tower leg
	Guy wires attached to tower
	Winch cable attached to tower with eye or hook attached to free end
	Communication antenna mounted and connected to radio
	Photo taken of AC power line trench, if AC powered and visible
	Buried AC power line locations in plot shown on as-built drawing
	Photo taken of AC power line trench, if AC powered and possible
	Circuit breaker and surge suppressor installed, if AC powered
	Fuse installed between battery and station
	Fuse installed between battery and precipitation gauge heater
	Battery connected to regulator and to station and station powered up
	Charging source connected to regulator and charging verified
	Program/setup downloaded to data logger
	LETS radio, cellular modem, or GOES transmitter installed, configured, and tested
	Air temperature probe installed and reading verified
	Relative humidity probe installed and reading verified, if provided
	Pyranometer installed and reading verified, if provided

	Cup anemometer connected to data logger and reading verified, if provided
	Prop vane installed
	Prop vane directional sensor oriented relative to true north
	Guy wire turnbuckles attached to anchors
	Tower raised and hinged section of tower base bolted to base plate
	Guy wires attached to turnbuckles
	Tower plumb and guy wire tension neither too loose nor too tight
	Guy wire turnbuckle safety cables installed
	Winch cable secured to bottom of tower
	All ground rods connected directly to east ground rod
	Logger enclosure and mast connected to east ground rod
	Lightning rod grounding cable connected to east ground rod
	Conduit installed between tower and precipitation gauge
	Precipitation gauge installed
	Precipitation gauge calibrated and calibration sheet complete
	2" soil moisture/temperature photo taken, if sensor provided
	4" soil moisture/temperature photo taken, if sensor provided
	8" soil moisture/temperature photo taken, if sensor provided
	20" soil moisture/temperature photo taken, if sensor provided
	40" soil moisture/temperature photo taken, if sensor provided
	2" soil moisture/temperature sensor installed, and reading verified, if provided
	4" soil moisture/temperature sensor installed and reading verified, if provided
	8" soil moisture/temperature sensor installed and reading verified, if provided
	20" soil moisture/temperature sensor installed and reading verified, if provided
	40" soil moisture/temperature sensor installed and reading verified, if provided
	Ground repaired over all trenches
	Fence installed, if necessary
	16 units of desiccant placed in logger enclosure, if applicable
	Logger enclosure cable entry points sealed, if applicable
	All sensor readings verified
	Positive communication and data collection verified between station and NERON monitoring facility
	As-built drawing complete
	Station metadata form complete
	4 post-installation photos looking toward station taken
	Cover shot photo taken
	Mast/precipitation foundation photos taken, if applicable
	Soil moisture/temperature plot photos taken
	GEONOR calibration sheet submitted to NERON Project Office
	Photos named as specified and submitted to NERON Project Office
	As-built drawing submitted to NERON Project Office
	Station metadata form submitted to NERON Project Office
	Installation checklist submitted to NERON Project Office

## Appendix C. Metadata Form

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The metadata form should be used to report initial installations and moves of stations, as well as any changes in station metadata beyond maintenance and equipment changes accounted for in the maintenance and trouble ticket forms.

The following is an explanation of how to enter information in all sections of the metadata form.

### C.1 Header

The header should be filled out completely any time the metadata form is used. If an update, enter only the information that has changed in the sections after the header.

- Select the form type in the drop-down menu at the top. Select the “Initial Installation” box if this is the first time the station is being installed. Select the “Move” box if an existing station is being moved to a new location nearby. Select the “Update” box if metadata is being updated for an existing station that is not being moved.
- Enter the 5-character station ID, the full station name, and circle the station type (REMO for a remote weather station, RPTR for a communication repeater, or BASE for a communication base station).
- Enter the effective date and time of the change in coordinated universal time (UTC). In the case of an installation or move, this is the time that the installation or move is totally complete and the station has been verified operational.

### C.2 Site Information

- Enter the latitude and longitude, as measured from the center of the site plot, using a GPS receiver with Wide-Area Augmentation System (WAAS) or differential capability, *in fractional degrees to 5 decimal places*. Enter the elevation, as measured by the same GPS receiver. Take a photo of the GPS display, formatted as described in the Site Installation Plan Photographic Documentation section.
- Enter the manufacturer and model number of the GPS used to determine latitude and longitude in the “LAT/LON SOURCE” box and the manufacturer and model number of the device used to determine the elevation in the “ELEV SOURCE” box. If a single GPS receiver is used for both lat/lon and elevation, enter the same information in both boxes. Enter the horizontal and vertical coordinate reference datums used by the GPS. The horizontal reference datum used must be NAD83 (North American Datum of 1983) or later, and the vertical reference datum used must be NAVD88 (North American Vertical Datum of 1988) or later. It is important to note the datum used, because errors of up to 150 feet can be introduced by assuming the wrong datum.
- Enter the offset of local standard time from Coordinated Universal Time (UTC), the magnetic declination (the number of degrees that a compass needle points east or west of true north; be sure to include “W” or “E,” as appropriate, after the number).
- Enter the state, county, climate division, the three-letter ID of the weather forecast office (WFO) in whose county warning area (CWA) the site is located, and the government property ID (if applicable).

- Circle the plot size, indicate whether a fence is installed around the perimeter of the plot, describe the type of fence, indicate whether the station is solar- or AC-powered, whether an enclosure heater is installed, and enter the number of ground rods, ground plates, and/or grounding mesh matrices installed.

### **C.3 Site Contact and Site Host Info**

Enter as much of the contact information as possible, so that the site contact – and site host, if different from the contact – can be contacted easily. The site host is the person who actually owns or manages the property.

### **C.4 Equipment Information**

Enter site-specific information about the installed equipment. In the top row, select the site power source, if a logger enclosure heater is installed, and the number of each type of ground installed.

- **PRECIP.** Enter the height of the precipitation gauge’s inlet above the ground in either centimeters or inches, the type of mounting foundation, whether or not antifreeze was added, if a weighing bucket gauge, and the type and amount of antifreeze, if added.
- **LOGG.** Enter the logger serial number, operating system or firmware version, the program or setup name, and the logger’s PakBus address, if a Campbell Scientific logger.
- **LETS RADIO.** Enter the frequency (or band of frequencies, in the case of a spread spectrum radio) at which the radio operates in MHz, the RF ID assigned to the station, the ID of the station’s RF subnet, if applicable, and the ID of the primary base station with which the site will communicate.
- **GOES RADIO.** Enter the NESDIS ID, the baud rate, the channel indicated on the NESDIS assignment sheet in the “GOES NESDIS CHANNEL” box, the channel actually entered in the transmitter configuration (which is roughly half the value of the NESDIS channel for many transmitters for 1200 baud channels) in the “GOES TXER CHANNEL” box, the transmit time of the first transmission of the day in seconds past midnight UTC (the number shown on the NESDIS assignment sheet is given in minutes and seconds and must be converted to seconds), the transmit window in seconds, and the interval between transmissions in seconds.
- **RADIO.** Enter the antenna height above ground level in meters or feet, select the type of antenna installed, the antenna gain in dBi or dBd, the true azimuth toward which the antenna is oriented, and the inclination relative to horizontal of the antenna if a GOES system.
- **SOLRP(S).** Enter the inclination of the solar panels (the direction the face of the panel is oriented) relative to horizontal.

Indicate if AC MAINS power is available within 300 feet of the site, if not already MAINS-powered, and document the direction, distance, and intervening terrain between the tower and the MAINS power source. Include photos, soil type, the presence of rocks, or anything else that will impact trenching for the MAINS line.

### **C.5 Site Access**

- Check the “Yes” box if National Weather Service and National Weather Service contractors will have unrestricted access to the site at all times, if “No”, explain all restrictions in the text box.

- If there will be a locked gate or door controlling access to the station, circle “Y” in the “Locked Gate?” box, “N” otherwise. If the site host will allow NWS to daisy chain its own lock at the gate or door, circle “Y” in the “NWS Lock Allowed?” box, “N” otherwise. If an NWS lock has actually been installed at the gate or door, check “Y” in the “NWS Lock Installed?” box, “N” otherwise. If there is a non-NWS key lock, enter the number of keys acquired for NWS and NWS contractor use. If there is a gate or door with a key lock, NWS or not, enter the key number or ID. If there is a combination lock, enter the combination.
- Indicate whether the LETS agencies will require identification to enter any of their premises (e.g., local PD, state highway patrol office, etc.)
- Indicate whether 2-wheel-drive vehicles and 4-wheel-drive vehicles will be able to drive to the site throughout the year, and if not, explain why not and when access will or will not be possible in the text box for both 2WD and 4WD.
- Indicate whether the site host prefers not to have vehicles driven off-road under any conditions or has any restrictions on the route driven to the site, and explain all preferences and restrictions in detail.

## **C.6 Site Driving Directions**

Describe how to drive to the site from a nearby intersection of two US/state highways or from an interstate highway exit. Include the distance driven to each turning or end point in tenths of a mile.

## **C.7 Site Host Special Instructions**

Indicate how the site host prefers that maintainers dispose of grass cuttings from the site plot and describe any other special instructions that the site host has for anyone who might visit the station.

## **C.8 Notes**

Take notes of any pertinent information that is not covered elsewhere in the form, which would have an effect on sensor exposure, station operation, or anyone visiting the site.



**NERON REMOTE STATION METADATA FORM**Form Type:  (Enter only changed information after first two lines for Update)

STATION ID	STATION NAME	STATION SUB-CLASS <input type="text"/>	UTC DATE EFFECTIVE	UTC TIME EFFECTIVE
TECHNICIAN NAME(S)		TECHNICIAN AFFILIATION		

**SITE INFORMATION**

SITE OPERATED BY ("NWS" OR PARTNER MESONET NAME)			UTC OFFSET (STD TIME)	MAGNETIC DECLINATION ° <input type="text"/>
LATITUDE (DEG, TO 5 DECIMAL PLACES) °	LONGITUDE (DEG, TO 5 DECIMAL PLACES) °	ELEVATION m	GPS SIGNAL AUGMENTATION <input type="text"/>	
LAT/LON SOURCE	ELEV SOURCE	HORIZ. COORDINATE REF DATUM	VERT. COORDINATE REF DATUM	
NEAREST CITY	STATE	GOV'T PROPERTY ID	PLOT SIZE <input type="text"/>	
TOWER FOUNDATION TYPE <input type="text"/>	GUY WIRE ANCHOR TYPE <input type="text"/>	FENCE INSTALLED? <input type="text"/>	FENCE TYPE	

**SITE CONTACT INFO**

NAME		TYPE	
ADDRESS			
CITY		STATE	ZIP
PHONE	FAX	EMAIL	

**SITE HOST INFO (If different from site contact)**

NAME		TYPE	
ADDRESS			
CITY		STATE	ZIP
PHONE	FAX	EMAIL	

**SITE PHOTOS**BEFORE INSTALLATIONSite outward-looking photos taken? ----- ☐GPS photo taken? ----- ☐

Optional: record photo number in appropriate box

SO_N (toward N)	SO_NE (toward NE)	SO_E (toward E)	SO_SE (toward SE)	SO_S (toward S)	SO_SW (toward SW)	SO_W (toward W)	SO_NW (toward NW)
GPS <input type="text"/>							

DURING INSTALLATIONTower/mast/precipitation anchor/foundation hole photos taken? ----- ☐AC power trench photo taken? ----- ☐Soil moisture sensor hole photos taken? ----- ☐Configuration deviation or notable finding photos taken? ----- ☐

Optional: record photo number in appropriate box

HTF	HPF	HSF		
ACT				
HSM05	HSM10	HSM20	HSM35	HSM50

**WHEN INSTALLATION COMPLETE**Site inward-looking photos taken? ----- ☐Cover shot taken? ----- ☐Tower/mast/precipitation anchor/foundation photo taken? ----- ☐Soil moisture plot photos taken? ----- ☐

Optional: record photo number in appropriate box

SI_N (toward N)	SI_E (toward E)	SI_S (toward S)	SI_W (toward W)	
TF	PF	SF		
SM05	SM10	SM20	SM35	SM50

All installaion photos uploaded? ----- ☐**SITE DESCRIPTION**

Describe the use of the property and surrounding area (i.e., pasture land used for grazing, grow wheat/barley/soy which is cut once/twice a year, tilled fields, etc.):

Describe terrain (360 degrees) - long distance (miles) and nearer (~300-600 meters) (i.e., rolling hills, steep escarpments, relatively flat, distance/direction to nearest town and size of town, etc.):

Site obstruction drawing completed? ----- ☐Site obstruction drawing scanned and uploaded? ----- ☐**EQUIPMENT INFORMATION**

POWER TYPE	LOGGER ENCLOSURE HEATER INSTALLED?	NO. OF GROUND RODS	NO. OF GROUND PLATES	NO. OF MESH GROUND POINTS
<input type="checkbox"/>	<input type="checkbox"/>			

<b>PRECIP</b>	HT OF INLET cm	TYPE OF FOUNDATION				
	ANTIFREEZE ADDED?	TYPE OF ANTIFREEZE	AMOUNT OF ANTIFREEZE L			
<b>LOGG</b>	SERIAL NUMBER	OS/FIRMWARE VERSION	PROGRAM/SETUP NAME		PAKBUS ID (CSI ONLY)	
<b>LETS RADIO</b>	LETS FREQUENCY/BAND (MHz) MHz	LETS RF ID	LETS SUBNET ID	LETS PRIMARY BASE ID		
<b>GOES RADIO</b>	GOES NESDIS ID		GOES BAUD	GOES NESDIS CHANNEL	GOES TXER CHANNEL	GOES TX TIME s
	GOES WINDOW s	GOES INTERVAL s				
<b>RADIO</b>	ANTENNA HEIGHT m	ANTENNA TYPE	ANTENNA GAIN dBi	ANTENNA AZIMUTH ° True	ANTENNA INCLINATION (HORIZONTAL = 0) °	
<b>SOLRP(S)</b>	TILT (AIMED AT HORIZON = 90) °					

If site not already AC-powered, is AC power available within approximately 300 ft? ----- ☐

If yes, document direction, distance, and intervening terrain between tower and AC power source, include photos, type soil, rocks, etc. that will impact trenching AC line.

Mass install form completed? ----- ☐

Mass install form uploaded? ----- ☐

As-built drawing completed? ----- ☐

As-built drawing scanned and uploaded? ----- ☐

Precip gauge calibrated? ----- ☐

Precip gauge calibration sheet completed? ----- ☐

Precip gauge calibration sheet uploaded? ----- ☐

### SITE HOST QUESTIONS

Is there active tilling of fields within 500 yards of the site? ----- ☐

Is there active irrigation of fields within 500 yards of the site? ----- ☐

If a fence has not already been installed, will one be required? ----- ☐

Will the host augment with manual data (i.e., snowfall, snow depth, river stage, etc.)? ----- ☐

If not already installed, will host allow a 33-ft tower for a wind sensor some day? ----- ☐

If yes to above question, would host allow guy wires to support the tower? ----- ☐

How does the host prefer that vegetation cuttings be disposed of? ----- ☐

Other host special instructions:

**SITE ACCESS**Must site host be notified (in person, if possible) prior to each maintenance visit? ----- ☐Will NWS and NWS contractors have unrestricted access to the site and be able to work late and on weekends? ----- ☐

LOCKED GATE?	NWS LOCK ALLOWED?	NWS LOCK INSTALLED?	NO. OF KEYS ACQUIRED	KEY NUMBER/ID	LOCK COMBO (IF APPLICABLE)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

List any site access restrictions that will be in place below:

Vehicle access to the site throughout the year: ----- ☐

If 2WD access not available throughout the year, explain below:

Does the site host prefer not to have vehicles driven off-road under certain conditions or have any restrictions on the route that is driven to the site on the host's land? ----- ☐

If so, explain below:

**SITE DRIVING DIRECTIONS**

(From the intersection of two US/state highways or from an interstate highway exit to the site. Include segment distances precise to the tenth of a mile)

**NOTES**

## **Appendix D. Mass Install Form**











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The NERON Trouble Ticket Form for Mass Installs Fixes or Moves is used to document the serial numbers of all installed equipment that is tracked in the NERON site metadata database.

**NERON TROUBLE-TICKET FORM FOR MASS INSTALLS, FIXES, OR REMOVALS**

STATION ID	STATION TYPE <input type="text"/>	UTC DATE ARRIVE	UTC TIME ARRIVE	UTC DATE DEPART	UTC TIME DEPART
TECHNICIAN(S)			AFFILIATION	ENTERED BY	DATABASE ENTRY DATE
DESCRIPTION OF PROBLEM					

Equip ID	Old SN	New SN	Description of Fix: (Include OSR, RPL, INI, RMV, NAT)	DB T-Tkt No. Updated
LOGG			<input type="checkbox"/>	<input type="checkbox"/>
WIRPAN			<input type="checkbox"/>	<input type="checkbox"/>
PRTMOD			<input type="checkbox"/>	<input type="checkbox"/>
RADIO			<input type="checkbox"/>	<input type="checkbox"/>
GPSANT			<input type="checkbox"/>	<input type="checkbox"/>
RS232IF			<input type="checkbox"/>	<input type="checkbox"/>
SERSRV			<input type="checkbox"/>	<input type="checkbox"/>
ETHHUB			<input type="checkbox"/>	<input type="checkbox"/>
ROUTER			<input type="checkbox"/>	<input type="checkbox"/>
SERADS			<input type="checkbox"/>	<input type="checkbox"/>
SERADH			<input type="checkbox"/>	<input type="checkbox"/>
PDA			<input type="checkbox"/>	<input type="checkbox"/>
SOLRP			<input type="checkbox"/>	<input type="checkbox"/>
SOLRPS			<input type="checkbox"/>	<input type="checkbox"/>
ACTRAN			<input type="checkbox"/>	<input type="checkbox"/>
UPS			<input type="checkbox"/>	<input type="checkbox"/>
TPS			<input type="checkbox"/>	<input type="checkbox"/>
VREG			<input type="checkbox"/>	<input type="checkbox"/>
VREGS			<input type="checkbox"/>	<input type="checkbox"/>
BATCHG			<input type="checkbox"/>	<input type="checkbox"/>
BATV			<input type="checkbox"/>	<input type="checkbox"/>
BATV			<input type="checkbox"/>	<input type="checkbox"/>
BATV			<input type="checkbox"/>	<input type="checkbox"/>
BATV			<input type="checkbox"/>	<input type="checkbox"/>
BATVS			<input type="checkbox"/>	<input type="checkbox"/>
BATVS			<input type="checkbox"/>	<input type="checkbox"/>
BATVS			<input type="checkbox"/>	<input type="checkbox"/>
BATVS			<input type="checkbox"/>	<input type="checkbox"/>

Equip ID	Old SN	New SN	Description of Fix: (Include OSR, RPL, INI, RMV, NAT)	DB
				T-Tkt No. Updated
TAIR1			<input type="checkbox"/>	<input type="checkbox"/>
TAIR2			<input type="checkbox"/>	<input type="checkbox"/>
TAIR3			<input type="checkbox"/>	<input type="checkbox"/>
PRECIP			<input type="checkbox"/>	<input type="checkbox"/>
BUCKET			<input type="checkbox"/>	<input type="checkbox"/>
VWPCP1			<input type="checkbox"/>	<input type="checkbox"/>
VWPCP2			<input type="checkbox"/>	<input type="checkbox"/>
VWPCP3			<input type="checkbox"/>	<input type="checkbox"/>
WET1,2			<input type="checkbox"/>	<input type="checkbox"/>
WSPD			<input type="checkbox"/>	<input type="checkbox"/>
WDIR			<input type="checkbox"/>	<input type="checkbox"/>
TPRECP			<input type="checkbox"/>	<input type="checkbox"/>
FLPHTR			<input type="checkbox"/>	<input type="checkbox"/>
FLDOOR			<input type="checkbox"/>	<input type="checkbox"/>
FANSP1			<input type="checkbox"/>	<input type="checkbox"/>
FANSP2			<input type="checkbox"/>	<input type="checkbox"/>



## **Appendix E. As-Built Drawing**

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**NERON STATION AS-BUILT DRAWING**

(Use only **BLACK INK** to facilitate scanning)

There is a standard configuration for a NERON station with a given plot size and tower/mast type, as specified in the site installation plan, but deviations may be necessary at the discretion of the installer. The drawing below shows the site from the edge of the plot inward as-built. Draw the outline of the plot, labeling its dimensions, and draw and label all site hardware, including the fence, if installed. List or show all variations from the standard NERON configuration, and indicate the routing of all sub-surface conduit and lines, the locations of all ground rods, plates, and/or mesh matrices, the locations and types of all guy wire anchors, and the heights and depths of all sensors installed, whether or not they conform exactly to specifications.

STATION ID	DATE	PLOT SIZE	TECHNICIAN NAME(S)	TECHNICIAN AFFILIATION
		24x24 32x32		

As-Built:



## **Appendix F. Obstruction Drawing**

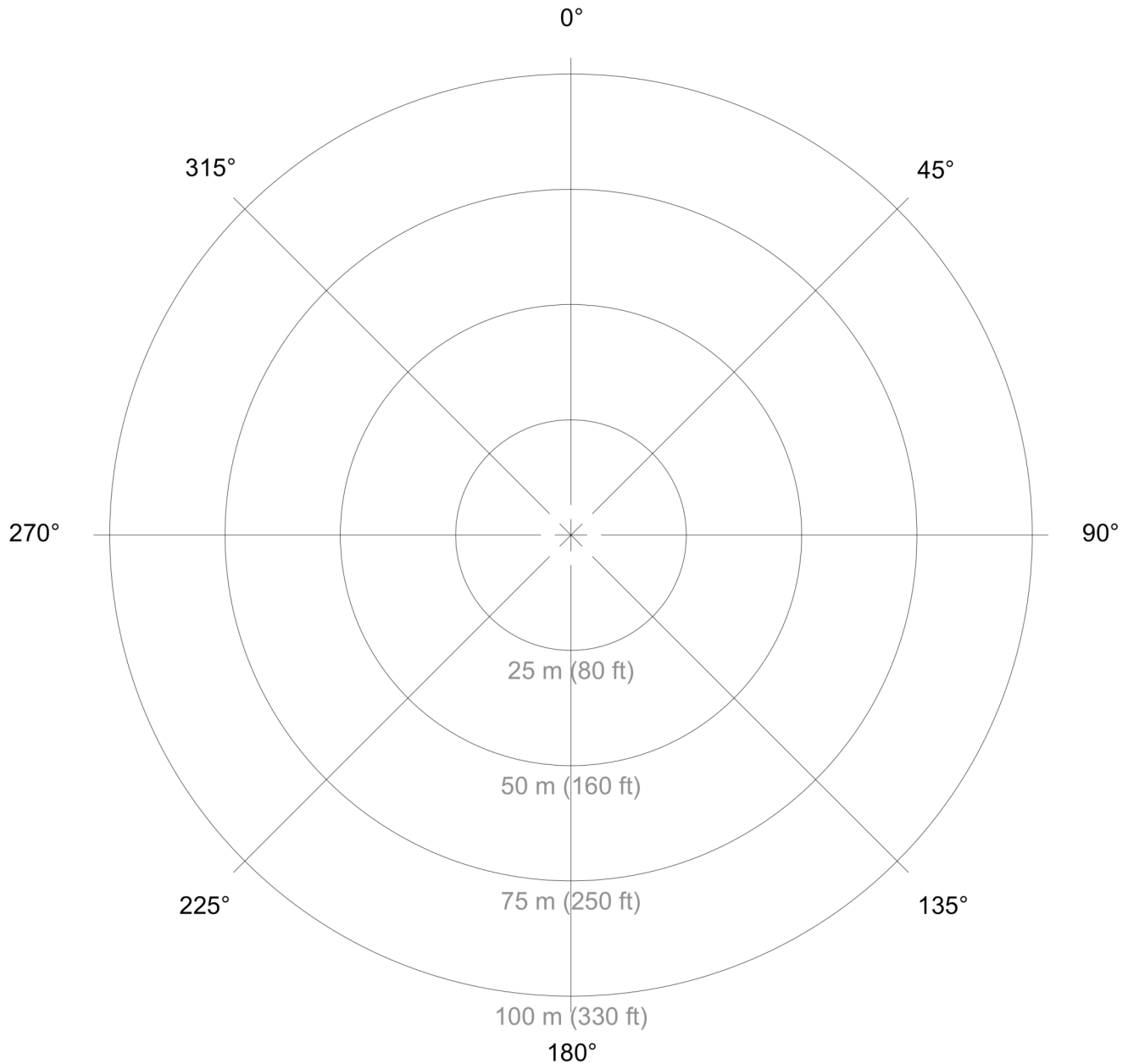
---

**NERON OBSTRUCTION DRAWING**

(Use only **BLACK INK** to facilitate scanning)

Draw each obstruction within 100 meters (330 feet) of the center of the plot, label its bearing from the center of the plot in degrees relative to true north, its angular height, and its distance from the center of the plot in meters below. The center of the circle below indicates the center of the plot and the edge of the circle represents the extent of the 100-meter range. Each range ring indicates 25 meters (82.5 ft.). In addition, label the locations of other significant terrain features that could affect instrument measurements, such as roads, parking lots, concrete slabs, and bodies of water.

STATION ID	DATE	TECHNICIAN NAME(S)	TECHNICIAN AFFILIATION
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## **Appendix G. Installation Issues Document**

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(TO BE INSERTED)

## **Appendix H. Site Visit Data Verification Form**

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(TO BE INSERTED)

## **Appendix I. Site Acceptance Checklist**

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(TO BE INSERTED)

## **Appendix J. NOAA Environmental Checklist for Proposed Actions (NEPA) Statement**

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A National Environmental Protection Act (NEPA) self-survey form is included in this appendix. This form must be completed to the best of the installer's ability. It is recognized that the installers may not be able to answer all of these questions. If the answer is not known please provide a response of "unknown". The WFO/state climatologist in whose CWA/state the site resides may be requested to conduct follow-on activities, or other of NOAA's partners may be required to conduct follow-up.



## NOAA Environmental Checklist for Proposed Actions

**Date:**

**Name:** NWS COOP Modernization Project

**Site Information:** (Longitude/Latitude in decimal degrees to 5 places to right of decimal)

Station Name: \_\_\_\_\_

County/Parish: \_\_\_\_\_ State: \_\_\_\_\_

Station Longitude: \_\_\_\_\_ Station Latitude: \_\_\_\_\_

Station Elevation: \_\_\_\_\_ Elevation Source: \_\_\_\_\_

### Detailed Project Description:

This project consists of site preparation and weather/climate monitoring instrument installation. The site will encompass approximately a 24x24 square foot area of land, which generally will not be fenced, on which a suite of weather monitoring instruments will be installed. An approximately 10 feet height tower will be installed, and a precipitation gauge. The remaining area in the plot will retain the original ground cover. Where possible, AC power to the site will be via underground cable with the burial depth dependent on local code requirements. Permits may be required to pull AC power from local lines to the site. Duration of site preparation and installation will not exceed 2 weeks. Following installation, the site will operate automatically with site maintenance frequency dictated by the location and the physical characteristics of each site.

		PRESENT <sup>2</sup>	
CONDITIONS FOR PROPOSED ACTIONS <sup>1</sup>		YES	NO
1.	<p><b>Will the proposed action degrade, disturb, or alter threatened or endangered animals or plants or their habitat? If it is not known whether the affected animals or plants are threatened or endangered, check YES.</b></p> <p>Sources: U.S. Fish and Wildlife Service (USFWS) and The Nature Conservancy (TNC)</p>		
2.	<p><b>Will the proposed action degrade or disturb previously undisturbed areas?</b></p> <p>Sources: TNC and visual site inspection</p>		
2a.	<p><b>Will the proposed action degrade or disturb an area that has been severely degraded?</b></p> <p>Sources: TNC and visual site inspection</p>		
3.	<p><b>Will the proposed action affect any areas that normally are inundated by water?</b></p> <p>Sources: U.S. Army Corps of Engineers (USACE), U.S. Geological Survey (USGS), and wetlands delineation maps</p>		

4.	<p><b>Will the proposed action create erosion and sedimentation or other types of pollution (for example, wastewater, chemical pollution) that will affect inundated areas?</b></p> <p><b>Sources:</b> USACE, USGS wetlands delineation maps, county soil conservation office, and county soil survey</p>		
5.	<p><b>Will the proposed action affect other water resources such as surface water or groundwater?</b></p> <p><b>Sources:</b> USGS wetlands delineation maps, groundwater modeling</p>		
6.	<p><b>Will the proposed action affect areas within the 100-year flood plain?</b></p> <p><b>Sources:</b> County planning office, flood insurance rate maps (FIRM), USACE</p>		
7.	<p><b>Will the proposed action disturb archaeological resources?</b></p> <p>Will the proposed action require any subsurface disturbance? If yes, has the affected area been disturbed previously? If no or unknown, check YES.</p> <p><b>Source:</b> State Historic Preservation Officer (SHPO)</p>		
8.	<p><b>Will the proposed action disturb historic resources?</b></p> <p>Will the proposed action require the disturbance of any buildings or structures constructed 40 or more years ago?</p> <p><b>Sources:</b> SHPO and local historic preservation office</p>		
9.	<p><b>Will the proposed action result (directly or indirectly) in the generation of large amounts of air pollution?</b></p> <p><b>Sources:</b> Project plans and local or state air regulatory agency</p>		
9a.	<p><b>Will the proposed action require any type of air quality permit?</b></p> <p><b>Source:</b> Local or state air regulatory agency</p>		
10.	<p><b>Will the proposed action affect any special status areas?</b></p> <p>Will the proposed action affect parks, wilderness areas, scenic rivers, or public recreation areas?</p> <p><b>Sources:</b> National Park Service and county or city planning office</p>		
11.	<p><b>Will the proposed action require a change in land use or create a conflict with existing land use?</b></p> <p><b>Sources:</b> County or city planning office or master plan</p>		
11a.	<p><b>Will the proposed action adversely affect the value of adjacent properties?</b></p> <p><b>Source:</b> County or city planning office</p>		
12.	<p><b>Will the proposed action generate large amounts of hazardous waste or any toxic waste?</b></p> <p><b>Source:</b> Project plans</p>		

13.	<b>Will the proposed action have any effects on human health or safety?</b>  <b>Sources: Project plans, and state or local department of health</b>		
13a.	<b>Will the proposed action emit dangerous levels of ionizing or non-ionizing radiation?</b>  <b>Source: Project plans</b>		
14.	<b>Will the proposed action create high levels of noise for an extended period of time?</b>  <b>Sources: Equipment manufacturer's information and noise modeling</b>		
15.	<b>Will the proposed action have long or short term aesthetic effects?</b>  Will it produce any visual effects or effects on scenery?  <b>Source: Project plans</b>		
15a.	<b>Will the proposed action require large amounts of outdoor lighting or create any unusual odors?</b>  <b>Source: Project plans</b>		
16.	<b>Will the proposed action require large amounts of water or electricity for an extended period of time?</b>  <b>Source: Project plans</b>		
17.	<b>Will the proposed action have long- or short-term effects on transportation infrastructure?</b>  Will the proposed action result in a large increase in local traffic? <b>Source: Project plans</b>		
17a.	<b>Will the proposed action require the expansion or upgrading of roads or bridges?</b>  <b>Source: Project plans and state department of transportation.</b>		
18.	<b>Although the effects of the proposed action may not be significant, do those effects add measurably to existing or reasonably foreseeable adverse conditions (resulting from local, state, federal, or private actions)?</b>		
19.	<b>Will the proposed action require the disturbance of any suspected or confirmed asbestos containing materials?</b>		

<sup>1</sup> The proposed action being assessed must be fully or partially funded, regulated, conducted, or approved by NOAA.

<sup>2</sup> All environmental resource areas for which YES is checked must be addressed in subsections of the "Affected Environment" and "Environmental Consequences" sections of the Environmental Assessment.

**If YES was checked for any of the items above, please list the item number, provide additional information about anticipated effects, and contact the NOAA Administrative Support Center Regional Environmental Compliance Officer as soon as possible.**


### **NOAA Categorical Exclusions**

**If none of the items on the check list were marked YES, select the applicable categorical exclusion (CX) below. If none apply, or if you have any questions about the applicability of the CX, please contact the NOAA Administrative Support Center Regional Environmental Compliance Officer.**

<b>APPLICABLE? YES/NO</b>	<b>CATEGORY</b>	<b>DESCRIPTION</b>
	Research	Programs or projects of limited size and magnitude or with only short-term effects on the environment. Examples include natural resource inventories and environmental monitoring programs. Such projects may be conducted in a wide geographic area without need for an EA or an EIS provided related environmental consequences have a short term effect.
	Financial and Planning Grants	Financial support services and programs, such as federal or state loans or grants where no environmental consequences are anticipated beyond those already analyzed in establishing such programs, laws, or regulations. If no initial analysis was prepared, NOAA would not require preparation of a retroactive environmental document. New financial support services and programs should undergo an environmental analysis at the time of conception to determine if a CX could apply to subsequent actions.
	Minor Planning Activities	Projects where the proposal is for environmental restoration or rehabilitation such as adding picnic facilities to a coastal recreation area unless the project's impacts in conjunction with past, present or reasonably foreseeable future actions could result in a significant impact to the human environment (CEQ sec. 1508.7).
	Pre-proposal Actions	Planning actions before a proposal exists do not require NEPA analysis. A "proposal" exists at that stage in the development of an action when a NOAA organization has a goal and begins its decision-making process, including consideration of environmental impacts, toward realization of that goal (CEQ 1508.23).

	Programmatic Functions	<p>The following NOAA programmatic functions with no potential for significant environmental impacts are generally exempt from the environmental documentation requirements of NEPA:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Routine experimental procedures</li> <li><input type="checkbox"/> Program plans and budgets</li> <li><input type="checkbox"/> Mapping, charting, and surveying services, ship support <ul style="list-style-type: none"> <li>• Fisheries financial support services</li> </ul> </li> <li><input type="checkbox"/> Basic research or research grants except as provided in section 6.02c.3 of NAO 216-6</li> <li><input type="checkbox"/> Enforcement operations, basic environmental services such as weather observations, communications, analyses, and predictions</li> <li><input type="checkbox"/> Environmental satellite services</li> <li><input type="checkbox"/> Environmental data and information services</li> <li><input type="checkbox"/> Air quality observations and analysis</li> <li><input type="checkbox"/> Support of international global atmospheric and Great Lakes Research programs</li> <li><input type="checkbox"/> Executive direction</li> <li><input type="checkbox"/> Administrative services</li> <li><input type="checkbox"/> Administrative support of the National Advisory Committee on Oceans and Atmosphere and other advisory bodies.</li> </ul>
	Regulations Implementing Projects or Plans	When an EA or EIS has been or will be prepared for specific projects or plans serving as the basis for the following activities, implementation of regulations within the scope of the plan and related NEPA documents will receive a CX. Examples include: coastal zone management programs; national estuarine or marine sanctuaries; fishery management plans; and regulations and waivers issued under sec. 101(a)(2), and 101(a)(3) of the Marine Mammal Protection Act (MMPA).
	Permits	Permits for scientific research and public display under the Endangered Species Act (ESA) and MMPA and grants under MMPA.
	Listing Actions Under Sec. 4(a) of ESA	ESA listing, delisting, and reclassifying species and designating critical habitat.
Yes	Others	Other categories of actions which would not have significant environmental impacts, including routine operations, routine maintenance, actions with short-term effects, or actions of limited size or magnitude.